Global Sustainable Development Report

Africa Consultation Workshop Synthesis Report
Port Elizabeth, South Africa
12 May 2018

A side event to the Seedbeds of Transformation Conference, Future Earth

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Contents

The Global Sustainable Development Report

The Global Sustainable Development Report (GSDR) was mandated by the United Nations Member States for the follow-up of the 2030 Agenda for Sustainable Development at the High-Level Political Forum, with the next edition due by December 2019. An independent group of 15 scientists (IGS) is currently drafting the report, which will provide guidance on the state of global sustainable development and transformative pathways. The report will help address the implementation of the 2030 Agenda by highlighting emerging trends and acting as a science-policy interface.

Transformative pathways to achieve the 2030 Agenda will be a central question addressed by the report, along with Sustainable Development Goals (SDGs) interactions towards policy coherence. Since these pathways are regional and often even country specific, the GSDR opened a consultation process across regions to reach out to local experts for their contribution and views on the report content.

Workshop background

The GSDR held a regional consultation workshop in Africa on 12 May 2018 in Port Elisabeth, South Africa, as a side event to the Future Earth conference *Seedbeds of Transformation: the Role of Science with Society and the SDGs in Africa.* The latter conference took place on 9-11 May 2018 and hosted about 350 participants. The GSDR consultation side event thus capitalized on a rich transformative change content presented during the Future Earth conference, and the presence of multi-stakeholder participants who attended both, the conference and the side event, totalling 54 participants at the side event (table 1). The French National Research Institute for Sustainable Development, the Centre for Development and Environment, University of Bern in Switzerland, and Future Earth facilitated the workshop with financial resources and human resources to organize the event. A steering committee composed of four African scientists was established, to validate the process, the list of participants, the working group themes and the objectives.

The GSDR consultation workshop steering committee set the following objectives:

- To support exchanges between African stakeholders reflecting on themes covered by the GSDR
- To enable the identification of priority SDGs and relevant trade-offs and co-benefits pertaining to Africa
- To share successful and failing pathways towards sustainable development in Africa
- To feed into the GSDR, and contribute to a vision for Africa's transformation pathway
- To bridge francophone African stakeholders with counterparts elsewhere on the continent

Structure of the workshop

Predating the 2030 Agenda, the African Heads of State and the Governments of the African Union adopted the Agenda 2063 in January 2015 laying down a 50 years vision for Africa with the following aspirations[1]:

1. A prosperous Africa based on inclusive growth and sustainable development
2. An integrated continent, politically united and based on the ideals of Pan-Africanism and the vision of Africa's Renaissance
3. An Africa of good governance, democracy, respect for human rights, justice and the rule of law
4. A peaceful and secure Africa
5. An Africa with a strong cultural identity, common heritage, shared values and ethics
6. An Africa whose development is people-driven, relying on the potential of African people, especially its women and youth, and caring for children
7. Africa as a strong, united and influential global player and partner

[1] Source. http://www.un.org/en/africa/osaa/peace/agenda2063.shtml

Prof Daouda Aïdara from the *Académie des Sciences, des Arts, des Cultures d'Afrique et des Diasporas Africaines* of the Côte d'Ivoire delivering a keynote address on the *Appel d'Abidjan*, calling for African governments to implement financial mechanism supporting science and technology produced in Africa.

Prior to the Agenda 2063, the African Union Heads and Government Summit adopted in January 2014 the Science, Technology and Innovation Strategy for Africa (STISA-2024), with science, innovation and technology considered the main drivers of socio-economic development in Africa.[2]

The steering committee agreed that this consultation workshop should adopt the STISA-2024 to frame the thematic content of the workshop. As a result, six working groups were formed, each of which focused on a specific STISA priority as follows:

- **Group STISA 1:** Eradicate hunger and ensure food and nutrition security
- **Group STISA 2:** Prevent and control diseases and ensure well-being
- **Group STISA 3**: Communication (physical and intellectual mobility)
- **Group STISA 4:** Protect our space
- **Group STISA 5:** Live together - Build the society
- **Group STISA 6:** Create wealth

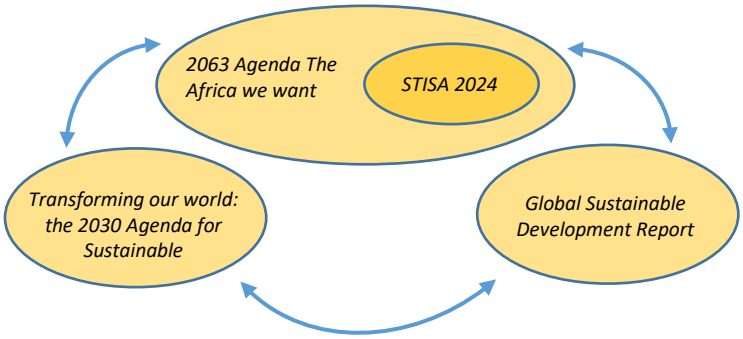


Figure 1: Triangulating African Agendas, 2030 Agenda, and the GSDR

Preceded by a welcome reception at the French Alliance during which Prof. Martin Bwalya Head of the Comprehensive Africa Agriculture Development Programme (NEPAD) presented NEPAD priorities to achieve the objectives of 2030 and 2063 Agendas, the workshop was organized around two key notes and six parallel sessions (the programme is available in Appendix 3).

[2] Source : https://au.int/sites/default/files/newsevents/workingdocuments/33178-wd-stisa-english_-_final.pdf

	Number of participants	Percentage from total (*n=54*)
Stakeholder categories		
Civil society	14	26%
Government agency	4	7%
Academia	32	59%
Private	4	7%
Gender balance		
Women	17	31%
Men	37	69%
Country types		
Developing	11	20%
Least developing countries	9	17%
Landlocked least developing countries	5	9%
Small island developing states	2	4%
Emerging	16	30%
Others	11	20%
Regions		
North Africa	3	6%
West Africa	11	24%
East Africa	9	19%
Central Africa	5	6%
Southern Africa	14	26%
Others	10	18%
Diaspora*	6	11%

Table 1: Participants to the GSDR consultation workshop
*Diaspora participants have their country of origin accounted above as well

The first keynote was given by Professor Sarah Anyang Agbor, Chair of African Union (AU) Human Resources Sciences and Technology Commissariat: "Inputs on priority areas from Science, Technology and Innovation Strategy for Africa 2024 (STISA-2024, 2030 Agenda, and 2063 Agenda for Africa)". The second keynote was given by Professor Daouda Aidara, Président of Académie des sciences, des arts, des cultures d'Afrique et des diasporas africaines - ASCAD: "Implementing transformations: the role of science and society in achieving the Sustainable Development Goals (SDGs) in Africa". Both keynotes have been transcribed and are available in Appendix 1.

The six parallel sessions were defined by the six STISA priorities as follows:

1. Group STISA 1: Eradicate hunger and ensure food and nutrition security:

Moderator: Boniface Kiteme, **Note taker**: Henri Rueff, **Participants**: Kwikiriza Benon - Martin Bwalya - Faten Hamdi - Ibrahima Ka - Baye Kaleab - Timothy Mbi Mkonyo Anyang - Drissa Sérémé - Theresa Tribaldos

2. Group STISA 2: Prevent and control diseases and ensure well-being

Moderator: Jean-Paul Moatti, **Note taker:** Ernest Foli, **Participants:** Kwabena Mante Bosompem - Frédéric Djinadja - Norbert Hounkonnou - Mahmoud Ibrahim Mahmoud - Amy Luers - Sandrine Eveline Nsango - Fanfan John Oliver

3. Group STISA 3: Communication (physical and intellectual mobility)

Moderator: Jackie Kado, **Note taker:** Peter Messerli, **Participants:** Al Hassan Baba Muniru - Andrew Leitch - Hambani Mashelini - Hannah Moersberger - Jean-Pascal Torreton - Jean-Paul Toutain

4. Group STISA 4: Protect our space

Moderator: Akiça Bahri, **Note taker:** Jean Albergel, **Partcipants:** Jean Luc Chotte - Mekki Insaf - Alioune Kane - Michael Obasola Olatunde – Flurina Schneider - Abdoulawahab Mohamed Toihr - Gete Zeleke

5. Group STISA 5: Live together - Build the society

Moderator: Sarah Anyang Agbor, **Note taker:** Cheikh Mbow, **Participants**: Robin Bourgeois - Wendy Broadgate - Aïdara Daouda – Désirée Kosciulek - Johanssen Odhiambo Obanda - Thokozani Simelane - Odirilwe Selomane

6. Group STISA 6: Create wealth

Moderator: Sarah Lawan Gana, **Note taker:** Myriam Truffert, **Participants:** Doudou BA - Ndiyamthanda Matshoba - Jo Mulongoy Kalemani - Anne Kyomugisha - Laura Pereira - Loubie Rusch

Key messages emanating from the working groups

The following messages were transversal throughout the working groups on transformative change in Africa**.**

1. Africa's transformation will come from within. "Nothing about us without us"

Africa should limit its foreign dependency and steer its own transformation agenda using as much as possible its own means, and capitalizing on positive and negative experiences from elsewhere. Reducing external dependency could be achieved by mobilizing more African resources in various sectors and support Pan-Africanism, while creating pro-Africa ownership and leapfrogging. By doing so, African science and innovation could be strengthened, health services improved, agricultural production including indigenous crops and breeds preserved and strengthened. The pursuit of a higher autonomy shall emanate from stronger institutions supporting a shared vision as stated in the Agenda 2063 and mobilizing resources for it.

There is a need to build profile of citizens that reflect an ambition for peace furthered by education that should go beyond instruction. It requires as well to harness values of governance and democracy: building regulations that are genuine and conducive to harmony, find channels for people to express themselves. Common history should be shared as a basis for connecting people, and communication schemes should be established between decision makers and citizens.

2. Supporting African science, technology and innovation (STI) is key for transformation

In order to achieve key message 1, Africa should mobilize its own resources to support African produced knowledge and science that can translate into technology and innovation including indigenous knowledge, as stated in the STISA-2024 agenda and more recently the "Call of Abidjan". By doing so, health, agriculture, skilled labour, and industrial solutions adapted to African needs can be developed.

Dr. Cheikh Mbow from Senegal stated: "South Korea was worse off when compared to Senegal in the 1970s. Today South Korea funds development programmes in Senegal" This rapid success of South Korea can in part be explained by the resources mobilized to support innovation. Professor Sarah Anyang Agbor, AU Commissioner for Human Resources, Science and Technology (AUC-HRST) indicated how the AU Agenda 2063 acknowledges the role of STI as a key enabler towards achieving sustainable development in Africa. Africa needs better coordination between research and industries, for example to transfer research findings on malaria to the industry for the production of new and more efficient drugs. Improved databases and access to data should emanate from this initiative. Overall, African science should seek solutions for African needs.

3. Africa should decouple food security and agriculture production

Food security in Africa is still too often associated to food production. Exiting poverty, being healthy and fit for work to access affordable food, having food distributed evenly across regions, and supporting locally produced food including indigenous crops and breeds will strengthen food security. HIV has devastated many households due to the illness of their only bread winners. This shows that food security is widely cross-cutting with other SDGs and cannot limit itself to agricultural production, although production does matter and should be kept diverse, nutritious and balanced to prevent undernourishment, obesity and hidden hunger.

4. Africa needs growing investments in health, education, and infrastructure

Investment in health, education, and infrastructure should be increased. Governments need to commit specific proportions of budgetary allocations in order to improve economic growth and well-being. This should take place under the framework of the SDGs. These investments could also create jobs, which have been alarmingly stagnating.

5. Job creation in Africa must match population growth

Despite uneven but substantial economic growth in recent years, Africa's employment is still grim with poor working conditions and limited opportunities for youth; a challenge compounded with population growth. Growth in Africa has been less pro-poor than elsewhere. Measures to secure decent jobs for a growing population are needed to ensure food security and poverty alleviation. Household enterprises, agriculture and the private sector have the potential to create most jobs. Governments should support education, implement adequate land policies to prevent the fragmentation of land and hence the economic feasibility of farms, and secure access to financial services for smallholders and households in order to support job creation.

6. Disease control is a prerequisite to achieve the 2030 Agenda in Africa

Transborder disease control planning and the use of geomedecine tools should be promoted to reduce the risk of pandemics, and rapid spread of diseases. Transdisciplinarity including a blend of academic, indigenous, community, and policy involvement should help disease control. Infrastructures improvement, quality management systems and standardization are also needed with integrative efforts such as the One Health model.

Key elements to be transmitted to the GSDR

In addition to the key messages formulated above taken from the inputs delivered by the working groups, a specific plenary session was organized where all participants could express directly what they felt needed to be inserted in the report. These elements were organized in four categories.

1. Socio-economic transformation in Africa

- What are the lessons learned from what prevented the achievement of the Millennium Development Goals?
- Aspect of ownership and self-defined concept of development: Achieve all SDGs through leap frogging, sovereignty and ownership, draw on bio-cultural diversity.
- Review trade treaties and agreements, and enable stronger negotiating skills on the continent.
- Role of cooperatives in creating links across institutional scales, food prices stabilization.
- Integrate the private sector in Africa.
- Pragmatic approach to get the attention of governments on SDGs.
- Sustainable development can only occur with interconnectedness of places.
- Address land grabbing.
- Stay pro Africa!

2. Role of education, science and innovation for sustainable development in Africa

- Need for more teachers and more doctors, see Generation 2030|Africa.
- Need for data and capacity for data generation connected to development programmes and monitoring.
- Supporting implementation should be the role of science (the science of implementation and monitoring of Agenda 2063 and other strategies).
- Integrated and transformative science and innovation 1) the 3 T's (Transgressive, Transdisciplinarity and Transformative) of science; 2) Social innovation; and 3) Business innovation.
- Increase the public investment for creation of knowledge and advancement of technologies.
- Innovative community participation is key.
- Link the 6 STISA's, no silos, link with the SDGs.
- Decolonize sustainability, education and science.
- Science should examine soft issues (institutions), and the grasping of it by decision makers.

3. Ensure healthy lives and promote well-being

- Enhance research facilities to support health services (not only public hospitals, but also laboratories).
- Have integrated approach to health.
- Make use of geomedicine to better control public health issues, and assessment for prevention.
- Control drug abuse.

4. Protect, restore and promote the environment

- Take action not only to adapt to climate change, but also to mitigate it. Both actions can be combined (4 per 1000 Initiative, Global Mechanism with Land Degradation Neutrality).
- Proactive early warning systems, see recurrent drought and climate change.
- Invasive alien species, and responsible body for risks and hazards.
- Take into consideration the various dimensions of land.
- Consider land use planning, see IPBES assessment.
- Develop the right infrastructures for a sustainable resources management (renewable and not renewable).
- Implement an integrated approach to the relationships between water, ecosystems, soil, energy, and agriculture.
- Promote the Integrated Water Resources Management (IWRM) model in all watersheds and especially in internationally shared basins

Appendix 1: Keynotes

Keynote 1: H.E. Prof Sarah Anyang Agbor – African Union Commissioner for Human Resources, Science and Technology

[Salutations]

Prof Jackie Olang – Kado, Executive Director of NASAC

Dr Ernest Foli, Senior Scientist at the Forestry Research Institute of Ghana, Author of the Global Sustainable Development Report mandated by the UN Member States

Prof Daouda Aïdara, Président de l'Académie des Sciences, des Arts, des Cultures d'Afrique (ASCAD)

Prof Peter Messerli, Director of the Centre for Development and Environment, Co-Chair of the Global Sustainable Development Report mandated by the UN Member States

Prof Jean-Paul Moatti, CEO of the French Institute of Research for Sustainable Development (IRD), Author of the Global Sustainable Development Report mandated by the UN Member States

Prof Doudou Ba, Président de l'Académie Nationale des Sciences et Techniques du Sénégal, Président de la Commission Nationale du Fonds Mondial de lutte contre le Sida, la Tuberculose et le Paludisme

Mr Martin Bwalya, Head of the Comprehensive Africa Agriculture Development Programme (CAADP)

Prof Hounkounnon Norbert, Président titulaire de la chaire internationale Unesco de physique mathématique (cipma), awarded, CNR RAO price of International Academy of Science

Distinguished Participants, Ladies and Gentlemen,

I bring to you the warm greetings of , the Chairperson of the African Union Commission, H.E. Dr. Moussa Faki Mahamat, who is equally preoccupied by the development agenda of the continent, in particular the implementation of 2030 Agenda and Agenda 2063.
Allow me to thank you for organizing this important "multi-stakeholders consultations workshop" to engage high-level African scientists, governments across the continent, development experts, civil society and the private sector to contribute to the UN Global Sustainable Development Report (GSDR). This report will indeed serve as a tool that will provide guidance on the state of implementation of the 2030 Agenda for global sustainable development and transformative pathways, that can guarantee progress on the goals set therein. I am therefore delighted to participate in this workshop in my capacity as Commissioner for Human Resources, Science and Technology of the African Union. The African Union believe that Agenda 2063 r the vision of an integrated prosperous and peaceful African continent driven by its own competent and skilled citizens can only be achieved by the role of Science, Technology and Innovation . Moreover we acknowledge that there is need for large-scale transnational collaborative approaches which pool together technical competencies and available resources. In this regard, within the African Union system, the Department of Human Resources, Science and Technology in the Commission is mandated to drive the development, coordination and implementation of appropriate policies and programmes in Education, Science and Technology.

Ladies and Gentlemen:

The African Union is fully aware that 2030 Agenda which fosters economic, social and environmental dimensions in a balanced and integrated manner; and Agenda 2063 "The Africa We Want" for inclusive growth and sustainable development are both critical instruments for the continent and therefore envisages a systematic, harmonious and integrated approach in the implementation process. This will minimize duplications, and dissipation of our scarce resources; optimize domestic resource mobilization; maximize benefits; engage external stakeholders and development partners and strengthened the much-needed partnerships and networks for implementation. The Specialized Technical Committee of Ministers of Finance, Monetary Affairs, of Economy and Development Planning and those in Charge of Integration recommended an integrated and coherent

implementation approach, with strong Monitoring & Evaluation and a single periodic performance report of these two agendas.

To realize this, the AU Commission Chairperson and the UN Secretary- General, on the margins of the January 2018 Summit, signed a joint **Framework for the Implementation of 2030 Agenda and AU Agenda 2063 for Sustainable Development**. This Framework envisions stronger coordination between the AU and UN to ensure the two Agendas are mainstreamed and integrated into national and sub-regional planning frameworks. We are confident that this implementation arrangement will not only deepen our cooperation but will enable us to jointly bring onboard different stakeholders to work together towards goals of the African Union.

Furthermore, we have deep conviction that Science, Technology and Innovation will play vital role in the implementation process. Both agendas require **Science, Technology and Innovation.** This workshop is therefore timely as it affords us a golden opportunity to place Science, Technology and Innovation at the epicenter of implementation of the two agendas. We need to promote the participation of our academia, research, industry, funding institutions, public and private sectors; strengthen collaboration and partnerships.

Look, during the development of AU Agenda 2063, the Commission ensured right from the onset that this agenda is underpinned by Science, Technology and Innovation as enablers of achieving the aspirations of the Africa we want! This Agenda articulates that Africa's sustained growth, competitiveness and economic transformation will require sustained investment in new technologies and continuous innovation in areas in all development sectors. The AU Assembly adopted three distinct strategies for advancing education and science, technology and innovation: (1) Continental Strategy for Education (CESA-16-25); (2) Continental Strategy for Technical and Vocational Education and Training; and (3) Science, Technology and Innovation Strategy for Africa (STISA-2024). These strategies will also contribute immensely to achieving the global Sustainable Development Goals (SDGs) and the creation of long-term economic benefits for the continent and beyond.

We elaborated a Science, Technology and Innovation Strategy for Africa, (STISA -2024), to accelerate the transition of African countries to innovation-led, knowledge-based economies through deploying STI across the socio-economic development sectors. We believe that the continent requires a more responsive, stronger and more dynamic sustainable research enterprise that is important to its economy and the society. STISA-2024 identifies four mutual prerequisites for improving the STI capacities in the continent: 1. building and upgrading research infrastructure; 2. enhancing professional and technical competencies; 3. promoting entrepreneurship and innovation; and 4. creating an enabling environment for STI development at all levels, national, regional and continental.

Being conscious that our countries are at different development levels, with differentiated capacities -financial, human capital, scientific and technological, STISA-2024 identifies six multi-disciplinary socio-economic research priorities that simultaneously address the SDG goals of 2030 Agenda and the Aspirations of Agenda 2063:

Priority 1	Eradication of hunger and achieve food and nutrition security
Priority 2	Prevention and control of diseases and for the wellbeing of African citizens
Priority 3	Communication (Physical & Intellectual)
Priority 4	Protection African space
Priority 5	Promote living together and building communities
Priority 6	Creation of wealth

These priorities are carefully selected to respond to the two agendas and address the challenges Africa is facing: 115 people die in every hour from diseases linked to poor sanitation, poor hygiene and

contaminated water. Sub-Sahara remains at 60% safe water coverage – leaving 40% of the 783 million people without access to clean drinking water. 153 million individuals, above 15 years of age again, in sub-Saharan Africa, suffered from severe food insecurity in 2014/15. Malaria; HIV and AIDS; Dengue; Tuberculosis; Cholera, dysentery and pneumonia among others are racking havoc on the continent. For example, in 2015, 90% of the 296 million malaria cases and 731,000 deaths occurred in Africa. Today, Africa accounts for 70% of all the world's HIV cases and related deaths. The Ebola outbreak in West Africa was the largest complex and most severe crisis that mysteriously and rapidly infected and killed many people. Climate variability is behind much of the prevailing poverty, food insecurity, and weak economic growth in many African countries. These numbers and challenges underline the significance role of science, technology and innovation and accompanied by relevant sustainable policies and programmes.

These challenges may not be addressed by governments single handedly or by STI alone. They require a functional system that is built on strong transnational collaborative approaches that utilize our diversity, range of existing capacities, and expertise, while leveraging international cooperation, strong partnerships and networks. This workshop today is not only feeding into the UN GSDR but is one of the concrete steps needed to understand STISA-2024 and a Call for Action.

STISA-2024 is itself innovative. The strategy urges and mobilises all key stakeholders, academics, researchers, innovators, funding bodies, entrepreneurs, private sector, civil society and the public to collectively and inclusively deploy science, technology and innovation in all sectors of our socio-economic development. For example, we should attain sustainable agriculture underpinned by strong R&D interventions if we are to effectively address food insecurity and be able to feed our growing population, which is projected to reach 1.6 billion in 2030. We must accelerate, diversify and continuously improve agricultural production in order to eradicate hunger and food insecurity (STISA-2024 Priority area 1

Ladies and Gentlemen:

Let me in conclusion, underscore and reiterate that if we are to contribute to achieving Africa's inclusive growth and sustainable development through the implementation of both agendas **2030 Agenda and AU Agenda 2063**, we need to identify the critical transformative pathways that can lead to progress and achievement of the goals we have set for ourselves for the benefit of African citizens. An african proverb says "For tomorrow belongs to those who prepared for it today". It is not only about knowing which is science but about implementing science for the transformation of the Africa we Want. That is why we speak of STI.I exhort you today that after this workshop, concrete and practical as well as implementable actions will be taken for the transformation of the Africa we want. The journey may be long, but we must act our part and walk the talk. We owe it to ourselves and our children. We must lead the transition we speak so much of in our different portfolios so we will not be counted as cemeteries of ideas and workshops. Today this workshop is for Science , Technology and Innovation collaboration for building capacity. Let us be like the good teacher who is likened to a candle, who consumes itself to light the way for others. We often say that A STITCH IN TIME SAVES NINE. With these remarks, I would like to wish you all a successful workshop and continued commitment to implement these two agendas.

I thank you!

Keynote 2: Prof Aidara Daouda – President of the Bureau of the Académie des Sciences, des Arts, des Cultures d'Afrique et des Diasporas Africaines

MISE EN ŒUVRE DES TRANSFORMATIONS : rôle de la science et de la société pour atteindre les objectifs du développement durable (ODD) en Afrique.

L'on me demande de parler de l'apport de la science et de la société à l'ODD en Afrique.

Peut – on parler de l'apport de la science dans des pays confrontés à la famine ?

Peut – on parler de la science dans des pays confrontés à la guerre civile ?

Peut – on parler de la science à des peuples contraints à l'exil en raison de leurs convictions religieuses ou politiques ?

Et pourtant, l'Afrique ne doit pas être absente de la mise en œuvre des ODD. Elle doit non seulement s'y intéresser, mais elle doit en être une des actrices actives. Elle le doit parce qu'elle fait partie du monde, notre planète commune dont la sauvegarde est notre intérêt à tous. Elle le doit, parce qu'elle est le maillon faible du système. Elle le doit, parce que c'est nous qui sommes en voie de développement et qui par conséquent, sommes interpellés plus que les autres par le DD. Ceux-là étant déjà développés même s'ils l'ont été en mettant – et continue de mettre - en péril notre planète.

Mais nous devons y aller avec la ferme volonté de relever certains défis spécifiques à l'Afrique qui ont trait :

- à la stabilité politique ;
- au développement économique ;
- à la sécurité alimentaire ;
- à la mondialisation du commerce ;
- à la maîtrise de l'énergie ;
- au réchauffement du globe ;
- à la montée du niveau de la mer.

Nous sommes confrontés, en Afrique, à des problèmes que les pays développés ont sans doute connus, mais qu'ils ont résolus au fil du temps.

Mais la bonne gouvernance, la démocratie, le respect des institutions, la lutte contre la sécheresse etc sont, me semble-t-il, des préalables au développement durable.

En effet, le monde assiste, impuissant, à une migration sans précédent inter-continent et souvent intra-continent. A y regarder de prêt, ces migrations sont justifiées par des raisons politiques, économiques, religieuses et/ou climatiques.

Qu'entend – on par Développement Durable ?

La définition du D.D peut varier selon l'angle que l'on a choisi. Elle peut être, économique, environnementale ou sociale. Mais, la définition la plus globalisante que je choisis est celle issue du rapport Brundtland 1987 (ONU) selon laquelle le D.D est un développement qui répond aux besoins du présent sans compromettre la capacité des générations futures aux leurs.

Objectif 1 : stabilité politique

Lorsqu'on observe avec objectivité la configuration du monde, on constate que celui-ci est subdivisé en trois (03) grands ensembles :

- les pays développés ;
- les pays émergents et
- les pays en voie de développement.

Les deux (02) premiers ensembles ont pour dénominateur commun la stabilité politique. Cette stabilité repose sur des institutions fortes sous-tendues :

- soit par une solide culture démocratique ;
- soit par une dictature musclée ;
- soit par une dictature éclairée.

Ces pays peuvent connaître la contestation politique ou sociale parfois violente, mais grâce à la solidité de leurs institutions ils arrivent toujours à l'endiguer. Le régime, quelle que soit sa nature, reste solide et stable. Comme le roseau de la fable de La Fontaine, il « plie mais ne rompt pas ». Dans un tel contexte, les objectifs identifiés de développement sont progressivement réalisés et/ou régulièrement adaptés aux contingences du moment.

Dans les pays en voie de développement par contre, l'on assiste en général, impuissant, à une instabilité politique chronique qui impacte négativement les objectifs de développement très souvent mal identifiés. Car quand ils le sont, la mise en œuvre est lente parce que constamment remise en cause.

Quelles sont les raisons profondes de l'instabilité politique ?

Pourquoi ce qui est vrai dans les pays du Nord, n'est-il pas toujours vrai dans les pays du Sud ? la réponse à ces questionnements pourrait se trouver dans la culture.

En effet, un regard sur le passé culturel africain fait ressortir (il y a à peine 04 décennies) que l'éducation de l'enfant dépassait le seul cadre familial pour s'étendre au village et à toute la communauté. Cette culture africaine reposait sur des valeurs solidement ancrées parce que solidement préservées et protégées qui s'ordonnaient autour :

- du respect de la hiérarchie et des principes ;
- de la valeur du travail ;
- de la culture de la discipline.

Ces valeurs qui étaient partagées par toute la communauté étaient inculquées à l'enfant par toute la communauté. Cette culture africaine endogène a été qualifiée d'archaïque par le colonisateur et remplacée par la leur dans laquelle l'africain ne se retrouve pas. A cette acculturation généralisée et subtilement entretenue, est venue s'ajouter la mondialisation entretenue par des techniques savamment élaborées dont l'une a pour nom ''nouvelle technologie de l'Information et de la communication'' (TIC).

Le monde est devenu petit, si petit qu'on le compare désormais à un village planétaire. Dans ce monde qui devait être, grâce aux TIC un monde de partage culturel où les différentes cultures devaient s'inter-féconder, c'est malheureusement, encore une fois, les cultures du Nord qui ont les moyens techniques et scientifiques, de s'imposer au Sud. Notre retard dans ce domaine ne nous permet pas hélas ! de proposer notre culture aux autres. C'est, me semble-t-il, un des fondements et une des explications de notre instabilité politique qui impacte significativement le développement du continent.

Objectif 2 : développement économique

Vu d'Afrique par un africain, le développement des pays développés ou émergents a reposé sur une industrialisation intense sous-tendue par la science, la technique et la technologie.

L'exemple de la petite Corée du Sud qui s'est hissée parmi les pays émergents, est édifiant et devrait servir d'école aux pays africains. En effet, en 1960, seuls 5% de jeunes coréens de 17-23 ans étaient inscrits dans les institutions d'enseignement supérieur. A cette époque, les exportations coréennes étaient évaluées a seulement 32 millions de dollars.

En 2011, le pourcentage de jeunes coréens de 25-34 ans ayant un diplôme d'études supérieures est passé à environ 64% (le plus élevé dans le monde à l'époque). Cette formation des ressources humaines qui s'est faite certes dans la douleur, a abouti à un développement rapide et prodigieux du pays. Car, elle s'est faite concomitamment avec l'industrialisation du pays axée sur la fabrication industrielle de produits de haute technologie. Il s'en est suivi un grand bond dans les exportations de produits de haute valeur ajoutée (électronique, matériel d'ingénierie, automobiles, appareils

électroménagers, acier de construction navale etc). Ce modèle peut être critiqué et est critiqué sur certains aspects, notamment l'entrée très sélective dans l'enseignement supérieur qui provoque souvent des suicides. Mais, le choix hardi et pertinent du modèle de développement a généré des ressources financières liées aux exportations de 720 milliards de dollars US (soit des ressources multipliées par 22,5 en cinq (05) décennies).

Comme la Corée du Sud, l'Afrique devrait, pour être émergente, identifier le modèle de développement conforme au potentiel de chaque pays et l'accompagner par une recherche scientifique et une technologie appropriée.

Pourquoi en effet, pour les productions agricoles par exemple (café, cacao etc) ne pas se donner les moyens de les transformer partiellement ou totalement avec une valeur ajoutée, plutôt que de brader ces productions dont les autres ont besoin, à des prix dérisoires fixés par des spéculateurs ?

La prise de conscience à cet égard a heureusement commencé dans certains pays du Sud. Mais il faut aller vite désormais. Pour y arriver il faut consentir le sacrifice financier qui s'impose pour la science et la technologie comme portes de sortie de la pauvreté.

Pour y arriver il faut être ambitieux et visionnaire. Inspirons nous du virage ambitieux et courageux qu'est en train de prendre la France en faveur de l'intelligence artificielle telle qu'annoncé ces temps-ci par le Président de ce pays. Ceci coûtera certainement cher à la France. Mais c'est le prix à payer pour être aussi performant, sinon plus performant, que les pays qui sont déjà en avance dans ce domaine. L'Afrique doit avoir, elle aussi, ce genre d'orgueil positif et accepter les sacrifices conséquents. Ce sacrifice sera surtout financier car, les ressources humaines qualifiées pour y parvenir, existent déjà et ne demandent que l'environnement scientifique, technique et technologique approprié pour s'exprimer.

Objectif 3 : la sécurité alimentaire

Pour des raisons économiques et alimentaires, la plupart des pays africains se sont orientés vers les productions agricoles vivrières ou de rente. Cet aspect est ou devrait être, un objectif du D.D. car la production de rente peut générer des ressources financières vitales et durables pour les pays africains. Quant à la production vivrière elle contribue à la lutte contre la faim et par conséquent, peut contribuer à lutter contre l'émigration. Cependant, ces productions devraient être rationnelles, massives et de qualité.

La rationalité consisterait à respecter un certain équilibre entre les deux types de production. La production de rente au détriment de la production vivrière peut aboutir à la famine ou à la dépendance du pays au plan alimentaire. La production intensive des cultures vivrières au détriment de la production de rente peut avoir un effet négatif sur l'économie.

Quoiqu'il en soit l'agriculture doit être sous-tendue par la recherche scientifique. En effet, cette agriculture qui doit être respectueuse de l'environnement ne doit plus être itinérante comme c'est le cas actuellement. Pour y parvenir, il faut pouvoir exploiter, dans la durée, la même superficie agricole, par des méthodes appropriées. Il en est de même de la prise en compte de la pénibilité de l'exploitation agricole. Il est évident, que les jeunes africains ne peuvent plus travailler dans les mêmes conditions que leurs parents et grands-parents. Dès lors, la mécanisation de l'exploitation agricole devient un impératif catégorique si l'Afrique veut (et elle doit) accéder à l'autosuffisance alimentaire.

Par ailleurs, la durabilité et la solidité de l'économie africaine résident dans la diversification. Le ''boum'' de l'exploitation pétrolière a montré le danger ou les limites, du développement monopolaire. L'histoire récente des pays producteurs de pétrole vient de montrer les dangers d'une telle orientation.

Objectif 4 : la commercialisation

S'il est souhaitable de produire plus et de meilleure qualité, il faut promouvoir, concomitamment, la commercialisation des produits à l'intérieur de l'Afrique d'abord puis entre l'Afrique et les autres continents ensuite. Les récentes statistiques à cet égard font apparaître que les échanges commerciaux

inter-africains sont de l'ordre de 15%. C'est ici un autre défi à relever. En effet, à quoi sert de créer des usines, de transformer partiellement ou totalement des produits, si le marché intra-africain est inexistant. La vétusté ou l'inexistence des infrastructures routières ou ferroviaires de transport est une des explications.

Et pourtant, il paraît indispensable de développer ce secteur si nous voulons nous développer durablement. Car, le commerce international qui est déjà confronté aux barrières commerciales, sera en outre limité par des considérations, très souvent évoquées de bonne ou de mauvaise foi, liées à la qualité des produits africains. Il faut donc, par la science et la technologie, se battre à arme égale avec les autres pays afin d'imposer les produits ''made in Africa''.

Objectif 5 : la maîtrise de l'énergie

Peut-on faire fonctionner nos usines et créer des moyens de transport fiables, rapides et peu polluants, sans maîtrise de l'énergie ? La maîtrise de l'énergie est un préalable au DD. Ici aussi, la science est invitée. Elle est invitée parce que l'Afrique est un continent globalement ensoleillé où l'énergie solaire pourrait, plus qu'ailleurs, être une solution durable. Pour y parvenir, il faut développer une recherche scientifique ambitieuse et volontariste en vue de la fabrication d'instruments performants, adaptés et peu coûteux pour être vulgarisables. Les solutions importées à cet égard restent, malheureusement trop onéreuses pour les citoyens africains. L'énergie hydro-électrique qui est produite dans plusieurs pays est une solution complémentaire. Mais celle-ci crée des problèmes de santé identifiés, qu'il faut prendre en compte dans l'étude de l'impact environnemental. Il apparaît en effet, une recrudescence de paludisme dans les zones d'implantation des barrages hydroélectriques. Il faut donc accompagner ces barrages d'infrastructures sanitaires appropriées en vue de lutter contre cette maladie et d'autres maladies hydriques.

Objectif 6 : le réchauffement du globe

Depuis quelques années, le monde s'émeut et s'inquiète des conséquences perceptibles partout, du réchauffement du globe. Les causes sont identifiées. Les responsabilités sont établies. Les pays du Nord sont reconnus être les plus grands pollueurs en raison de leurs activités socio-économiques. L'Afrique qui est moins pollueuse que les autres continents est malheureusement très impactée par le comportement du Nord. Le monde est en péril ; pourtant ce monde n'arrive pas, malgré le danger qui le menace, à mettre en œuvre les mesures courageuses qui s'imposent.

En ce qui concerne l'Afrique, le constat est que nos forêts continuent d'être déboisées pour des raisons financières par ceux-là mêmes qui tirent sur la sonnette d'alarme. En contre partie, l'on nous encourage à reboiser. Un reboisement médiatique car, l'on ne prend généralement pas les mesures idoines pour suivre la survie de l'arbuste planté. Celui-ci très souvent meurt de sa plus belle mort faute d'entretien. Quoiqu'il en soit, le reboisement corrige une partie du problème mais pas tout le problème ; car la biodiversité entretenue par un arbre âgé de 100 ans ne peut être entièrement réhabilitée qu'au bout de 100 autres années.

Mais l'Afrique peut, si elle le veut, éviter les erreurs des pays du Nord et accéder à un développement durable en appréciant en aval les impacts environnementaux de tous nos projets de développement. Les apports de la science devraient aider l'Afrique à être ce qu'elle doit être, c'est-à-dire le poumon du monde. Faute de quoi, c'est le désert qui se substituera à nos forêts luxuriantes, avec, pour conséquence, le déplacement des populations.

Objectif 7 : la lutte contre la progression de la mer

Les côtes de nombreux pays africains sont de plus en plus menacées par la mer. Cette progression préoccupante est de 2 m par an dans certains pays. Les causes identifiées sont en grande partie liées à la fonte des glaciers de l'antarctique. Si le dérèglement climatique consécutif au réchauffement du globe se manifeste au Nord par des cyclones, des ouragans ou des tsunamis, il se manifeste en Afrique, en plus de la désertification, par la montée des eaux marines. Malheureusement, les moyens financiers

importants à dégager pour y faire face manquent. De fait, nous assistons, impuissants, à la progression des océans au risque de nous réveiller un jour sous les eaux.

Par ailleurs, la population mondiale qui augmente à une vitesse vertigineuse, rend de plus en plus insuffisantes les ressources alimentaires. Parmi celles-ci, il y a les ressources agricoles qui s'épuisent au fil des années. Il devrait être un objectif majeur pour l'Afrique d'imaginer des mesures alternatives, susceptibles de compenser la réduction de protéine animale, notamment celle liée aux ressources marines. Le développement de la pisciculture partout où cela est possible, pourrait être une solution, s'il est accompagné par une recherche scientifique innovante.

Conclusion

De ce qui précède, il ressort que l'Afrique ne peut pas ne pas adhérer aux ODD identifiées. Car, sans être parmi les grands pollueurs de la planète, elle est impactée autant que ces pollueurs par les conséquences de la pollution. Mais la différence entre les pays du Nord et ceux du Sud réside dans les leviers du développement mis en œuvre. Pendant que les premiers sont en compétition pour la conquête de l'espace grâce à la maîtrise de la science, de la technique et de la technologie, les seconds sont à la recherche de satisfaction des besoins les plus élémentaires.

Le véritable défi que doit relever l'Afrique est donc de mettre en place des centres d'excellence de classe mondiale dans des domaines identifiés pour son développement tels que :

- l'ingénierie ;
- l'agriculture ;
- la biotechnologie ;
- la technologie de l'information ;
- les sciences des matériaux etc.

Ces centres, une fois créés, doivent être fortement en cohérence avec l'industrialisation nécessaire du continent, une industrialisation soucieuse et respectueuse de l'environnement. Car le défi majeur que l'Afrique doit relever est celui d'inventer un modèle innovant de développement, un développement identique ou supérieur à celui des autres mais avec des techniques et des technologies différentes parce que moins ou non polluantes pour la planète.

Comme on le voit ce défi est un défi difficile mais pas insurmontable. Car nous pouvons le relever grâce au génie créateur africain ; un génie longtemps étouffé mais qui, réveillé, peut faire des miracles.

Il faut y croire ; nos dirigeants politiques doivent y croire parce que les scientifiques africains le peuvent. Ils le pourront si nos dirigeants consentent à investir le financement nécessaire à l'avènement de la science sur le continent.

Il est temps que ces dirigeants politiques africains réalisent que la vraie richesse de nos pays réside dans les ressources humaines à former pour mettre en œuvre une politique ambitieuse de développement.

Ceci nécessite, bien entendu, un financement approprié, qu'il faut nécessairement consentir car, qui investit aujourd'hui dans la recherche scientifique et l'innovation s'enrichit demain.

C'est le sens de l'appel d'Abidjan en faveur de la science et de la technologie, lancé par de nombreuses personnalités africaines à la veille du sommet UA-UE d'Abidjan des 29 et 30 novembre 2017.

Appendix 2 Working groups synthesis

Group STISA 1: Eradicate hunger and ensure food and nutrition security

Moderator: Boniface Kiteme, **Note taker**: Henri Rueff, **Participants**: Kwikiriza Benon - Martin Bwalya - Faten Hamdi - Ibrahima Ka - Baye Kaleab - Timothy Mbi Mkonyo Anyang - Drissa Sérémé - Theresa Tribaldos

STISA priority 1 is stated as: To alleviate poverty and spur social and economic transformation on the continent, the African Union pays special attention to the development of Rural Economy and Agriculture through various instruments such as the Comprehensive Africa Agriculture Development Programme (CAADP). Statistics show that continued food insecurity directly affects 239 million Africans, with 30% to 40% of children under the edge of 5 years continuing to suffer from chronic under-nutrition at a critical stage for both survival and cognitive and physical development. In January 2013, the Heads of State and Government of African Union, together with representatives of international organizations, civil society organizations, private sector, cooperatives, farmers, youths, academia and other partners, unanimously adopted a Declaration to end hunger in Africa by 2025. In this regard, Africa must build its response capacities and capabilities and leverage existing relationships with relevant partners outside Africa, to deal with emerging challenges, such as low commodity yields, climate change and variability, water and land management, and increasing price volatility in global markets which could undermine efforts to eradicate hunger and achieve food and nutrition security. Processing, conservation and distribution of agricultural products goes far beyond the framework of rural and agricultural development sectors and requires a concerted intervention of STI.

Definition of food and nutrition security

- FAO defines food and nutrition security as**:** Food security is achieved, if adequate food (quantity, quality, safety, socio-cultural acceptability) is available and accessible for and satisfactorily utilized by all individuals at all times to live a healthy and happy life.
- Food systems encompass a social, economic, and political systems

Poverty and access to food

- Poverty impedes access to food, and a majority of the population in Africa lives under poverty, both are closely connected.
- Health is another factor. The impact of HIV reduces access to labor and increases medical bills further amplifying poverty and hence complicating the access to food. Many families have lost their only bread winner that way, and have become food insecure households.
- Poverty and food, the AU has put special attention on rural economy and agriculture.
- Demand of urban societies is more meat oriented. Most nutritional foods are not affordable.
- Many people cannot afford eating what they should eat. Shifting to a monotype diet, and hence health issues.
- Recognition of value of fish on the protein side,
- Africa has to focus on enabling affordability of food
- Post-harvest management can be broken into different elements. Some families consume food adequate for 12 months in 3 months, and then acquire food from supermarkets.

Dietary behavioural change, health, and sovereignty

- STISA 1 needs to take SDG 3 on board for good health and well-being.

- Gender, culture, conflict, national differences, infrastructures are important elements to be considered in food systems.
- There is need to link food security to diets and quality of food. Chronic undernutrition, underproduction should be well highlighted. Current context is a triple burden with malnutrition, hidden hunger (micronutrient deficiency), and obesity. All countries are affected, by 2030 we may have the most alarming rate of obesity, we need to learn lessons from food industries and not replicate that. Cheap processed food, extensive shelve life, as we want to process and think of production, we need healthy community healthy continent. These are important knowledge gaps.
- Cultural aspect and changes, everybody wants rice and potatoes. There has been rapid changes in diet habits, which have tended to disfavour what is Africa in terms of cropping. The range of abandoned crop is widening, several foods are not good enough to appear on the market, and hence are not produced anymore, although these abandoned crops are highly suitable to African climate and should be maintained, also when considering the importance of crop diversity.
- Increased supermarkets, food is much more expensive. The food environment is changing, so are behaviours and dietary habits. Our children do not eat anymore what we used to eat.
- Cheap processed foods are filtering in.
- Sovereignty. Underline the point that in terms of transformative change, go back to culture food habits, values, there is a lot of stagnation today resulting from a change in food habits. How do we move things forwards, to support local values and habits, and they are important in the food equation. Misleading perception “if you are civilized, you have to eat rice!”
- Restauration of African feeding products and habits should be reintroduced
- Rich nutritious vegetable, but eaten by the poor (perception issue).
- In Burkina Faso ministerial decree, all foods served at coffee breaks and lunches should be local foods.
- Celebration, and school feeding is local farm products, only what farmers produce.
- How to teach people to eat the local product? They do tests to compare the nutritional value. Imported rice has a lot of sugar, less sugar for the rice grown in Senegal.

Land, farming, Labor

- Africa is rural continent, and rural population will still grow till 2050.
- Young people do not want to work in agriculture, because farming used to pay but now is precarious. One reason explaining the precariousness of farming today is the fragmentation of land due to inheritance. Farming on ever-smaller plots is unprofitable.
- Big agro-industries deprive workers from their labor rights.
- Taking into context urban rural dynamics, rural households still produce out of their land, but increasingly a lot of income comes from urban areas and replaces rural income.
- Why is there such demotivation to take rural jobs by youth? How can we incentivize? Aging population cannot adequately work on farms either. Need to respond t the decline of interest of the younger generation.
- Contrasting views on smallholders. Some do not want to glorify small and subsistence farming, and would like to see Africa moving out of that.
- Evicted people are often moved into areas that produce little.

- Farmers are more aware of biological control when on their land.
- Access to land is increasingly an issue, as a means for production. Land rights are specific on the African continent with mostly collective rights mostly in Africa.
- Labor aspect in food systems is important because both urban and rural areas have growing population but stagnating jobs.
- Dualism of land tenure, traditional customary system and modern system.
- Land rights, the intra-household insecurity affects production.
- In Kenya there was no mechanism of transfer of ownership. New generation cannot invest in the land because they are not 100% owners. Women still do not have access to land ownership, although new regimes allows for it.
- We need to consider labor in food security.
- Agro-forestry and agro tourism are solutions to address land tenure and population growth issues.

Agriculture production

- Food issues are also highly connected to climate change, international trade and low yields issues.
- Tunisia wants to go organic for exports, but farmers do not want to do so, because waste of water, Tunisian eat pesticides, and export the best of their farming production to the north.
- More diversity of crop is needed to maintain a healthy system.
- Food security goes beyond production. We need to decouple food security and agriculture. Food security is also about institutions controlling distribution and affordability of food.
- Better synergies between production, processing and distribution. One feature of rural areas in Africa is that production and legislation, and processing should be massively produced to supply supermarkets.
- Indigenous crops and livestock are understudied (diversity is a key element of food security, and hence indigenous crop and livestock should be preserved). This is an important knowledge gap.
- Uganda non-food crop, much of land in Uganda dedicated to crop.
- Some communities in Kenya, have gone though no yield because they took the wrong seeds.
- Can we connect the different ecosystems at the continent levels? We may use symmetrical features (Climate, soils, etc…) of the continent (assist vulnerable areas with production from symmetrically opposite regions). Connect ecosystem, synchronize symmetrical patterns, climate, geology in order to produce and allocate food more efficiently, the model is cost efficient (needs infrastructure, security).
- Substantial post-harvest losses, due to poor transportation and related instructure. Africa produces enough food, but much if it is lost and feeds livestock when it cannot reach human consumption.
- Asia has invested in breeding these rice, Africa not.
- Sustainability and aspects of locally sourced, territorial aspect of food systems. We don't source our traditional food from elsewhere in the country.
- Pathway: local and sustainably produced food .

- Schools should have land to produce their food
- Water management good practices in order to sustain food security.
- Picking fish in the rivers to grow fish, promotion of aquaculutre.
- Collecting fish from the river for growing fish transfornmational.
- Biological spread invasive species.
- Post-harvest technologies, 20% of post harvest has potential (root crops).
- Water-food-energy nexus; forests can provide all that.

Value chain, regulatory aspects, governance

- Food system value chain is: production, processing steps, infrastructure distribution, consumption.
- The regulatory environment in African food system is weak
- Market integration within Africa, need to shift to a more local distribution system when possible.
- Too often, rural people provision in supermarkets instead of household production. Food basket in Uganda locally grown at household decreased from 78% to 40 %.
- Smallholder contribute a lot to food security, and large scale industrial production go against nutritional production.
- A healthy environment, regional planning, and efficient trading supporting exports are need for smallholders to remain producers.
- Other changes in food and diet habits in rural Senegal occur because rural people want to
- Link between farmers and consumers used to be connected, but becoming reducing exit poverty and access food in supermarkets. Also, imported rice cooks well and is cheaper compared to locally grown rice.
- Cultivating maize mill (pap, polenta), I need technology to make large production. You need technology for pap processing and packaging. We are not scaling up to larger technologies.
- Links beztween schools and farmers for producing what we are eating and selling it.
- Providing incentives: transformative pathway that looks at the entire value chain, so that benefits are higher.
- Illegal imports of livestock from other countries, impacts on disease spread.
- Territorial, governance aspects together, systemic approach to development.
- Allowing ebough sphere for decision makers in our countries irrespective. Independenace to decide what's good for them
- Transgenic crop, political issue, sensitive issues, conflict of interest, behaving on behalf of people on the ground.
- Sovereignty has been more negative than positive. Shift from national to territorial would be more efficient and positive.

References on food systems in Africa:

Abass, A.B., Awoyale, W., Alenkhe, B., Malu, N., Asiru, B.W., Manyong, V., Sanginga, N., 2018. Can food technology innovation change the status of a food security crop? A review of cassava transformation

into “bread” in Africa. Food Reviews International 34, 87–102. https://doi.org/10.1080/87559129.2016.1239207

Alamu, E.O., Maziya-Dixon, B., Dixon, A.G., 2017. Evaluation of proximate composition and pasting properties of high quality cassava flour (HQCF) from cassava genotypes (Manihot esculenta Crantz) of β-carotene-enriched roots. LWT 86, 501–506. https://doi.org/10.1016/j.lwt.2017.08.040

Annor, B., Badu-Apraku, B., 2016. Gene action controlling grain yield and other agronomic traits of extra-early quality protein maize under stress and non-stress conditions. Euphytica 212, 213–228. https://doi.org/10.1007/s10681-016-1757-4

Badu-Apraku, B., Annor, B., Oyekunle, M., Akinwale, R.O., Fakorede, M.A.B., Talabi, A.O., Akaogu, I.C., Melaku, G., Fasanmade, Y., 2015a. Grouping of early maturing quality protein maize inbreds based on SNP markers and combining ability under multiple environments. Field Crops Research 183, 169–183. https://doi.org/10.1016/j.fcr.2015.07.015

Badu-Apraku, B., Fakorede, M. a. B., 2017. Breeding of Quality Protein and Provitamin A Maize, in: Advances in Genetic Enhancement of Early and Extra-Early Maize for Sub-Saharan Africa. Springer, Cham, pp. 217–244. https://doi.org/10.1007/978-3-319-64852-1_9

Badu-Apraku, B., Gedil, M., Fakorede, M. a. B., Akinwale, R., Fasanmade, Y., Annor, B., Talabi, A.O., Oyekunle, M., Akaogu, I.C., Aderounmu, M., 2015b. Gene action and heterotic groups of early white quality protein maize inbreds under multiple stress environments. Crop Science. https://doi.org/https://dx.doi.org/10.2135/cropsci2015.05.0276

Baye, K., 2017. The Sustainable Development Goals cannot be achieved without improving maternal and child nutrition. J Public Health Policy 38, 137–145. https://doi.org/10.1057/s41271-016-0043-y

Boukar, O., Massawe, F., Muranaka, S., Franco, J., Maziya-Dixon, B., Singh, B., Fatokun, C., 2011. Evaluation of cowpea germplasm lines for protein and mineral concentrations in grains. Plant Genetic Resources 9, 515–522. https://doi.org/10.1017/S1479262111000815

Exploiting natural variation in exotic germplasm for increasing provitamin-A carotenoids in tropical maize | SpringerLink [WWW Document], n.d. URL https://link.springer.com/article/10.1007/s10681-015-1426-z (accessed 5.22.18).

Ishikawa, H., Boukar, O., Fatokun, C., Shono, M., Muranaka, S., 2017. Development of calibration model to predict nitrogen content in single seeds of cowpea (Vigna unguiculata) using near infrared spectroscopy. Journal of Near Infrared Spectroscopy 25, 211–214. https://doi.org/10.1177/0967033517712129

Konate, L., Baffour, B.-A., Traoré, D., 2017. Combining ability and heterotic grouping of early maturing provitamin A maize inbreds across Striga infested and optimal environments. Journal of Agriculture and Environment for International Development (JAEID) 111, 157–173. https://doi.org/10.12895/jaeid.20171.572

Menkir, A., Maziya-Dixon, B., Mengesha, W., Rocheford, T., Alamu, E.O., 2017. Accruing genetic gain in pro-vitamin A enrichment from harnessing diverse maize germplasm. Euphytica 213, 105. https://doi.org/10.1007/s10681-017-1890-8

Okeke, U.G., Akdemir, D., Rabbi, I., Kulakow, P., Jannink, J.-L., 2018. Regional Heritability Mapping Provides Insights into Dry Matter Content in African White and Yellow Cassava Populations. Plant Genome 11. https://doi.org/10.3835/plantgenome2017.06.0050

Pereira, L.M., 2017. Cassava bread in Nigeria: the potential of “orphan crop” innovation for building more resilient food systems. International Journal of Technology and Globalisation 8, 97. https://doi.org/10.1504/IJTG.2017.088958

Rabbi, I.Y., Udoh, L.I., Wolfe, M., Parkes, E.Y., Gedil, M.A., Dixon, A., Ramu, P., Jannink, J.-L., Kulakow, P., 2017. Genome-Wide Association Mapping of Correlated Traits in Cassava: Dry Matter and Total Carotenoid Content. Plant Genome 10. https://doi.org/10.3835/plantgenome2016.09.0094

Shittu, T.A., Dixon, A., Awonorin, S.O., Sanni, L.O., Maziya-Dixon, B., 2008. Bread from composite cassava–wheat flour. II: Effect of cassava genotype and nitrogen fertilizer on bread quality. Food Research International 41, 569–578. https://doi.org/10.1016/j.foodres.2008.03.008

Udoh, L.I., Gedil, M., Parkes, E.Y., Kulakow, P., Adesoye, A., Nwuba, C., Rabbi, I.Y., 2017. Candidate gene sequencing and validation of SNP markers linked to carotenoid content in cassava (<Emphasis Type="Italic">Manihot esculenta</Emphasis> Crantz). Mol Breeding 37, 123. https://doi.org/10.1007/s11032-017-0718-5

Group STISA 2: Prevent and control diseases and ensure well-being

Moderator: Jean-Paul Moatti, **Note taker:** Ernest Foli, **Participants:** Kwabena Mante Bosompem - Frédéric Djinadja - Norbert Hounkonnou - Mahmoud Ibrahim Mahmoud - Amy Luers - Sandrine Eveline Nsango - Fanfan John Oliver

STISA priority 2 is state as*:* Every year millions of Africans die of communicable and non-communicable diseases that are preventable and treatable; as a result of weak and fragmented health systems; inadequate resourcing to scale proven interventions; limited access to health services and technologies (particularly in rural areas); poor human resources management ; and extreme poverty. African countries will not develop economically and socially without substantial improvements in healthcare delivery. The 2013 Abuja Special Summit on HIV/AIDS, Tuberculosis, and Malaria highlighted the need to utilize and build on our research capacities to produce new and effective medicines, diagnostic tools, vector control tools and vaccines, and to promote research, invention and innovation in traditional medicine and strengthening local health ecosystems, taking into account the socio-cultural and environmental situation of the people. In addition, the AU and its Member States must prioritise establishing greater coordination both among health stakeholders as well as with other related sectors contributing to the development of science and technology and building governance structures to promote ethics and research integrity, thus increasing public trust in research. This will require a collaborative effort among various actors to promote and implement key policies and programmes on primary health care, as well as disease prevention and control.

The group acknowledged that:

- Adopting the priorities to the African context may be limited by the fact that priorities may differ in different parts of Africa, although there should be convergence.
- Practical lessons of successes and failures are reflected in the outcomes of the Seedbeds of Transformation" conference.
- The GSDR should give examples of infectious diseases that have occurred, but should look beyond these. The report should also focus on strengthening the provision of global public goods.

Discussions and recommendations:

- Limited investment in health and education: Governments to be compelled under the NEPAD to commit specific proportions of budgetary allocations to health and education in order to improve economic growth and well-being. This should be under the framework of the SDGs.
- Focus on treating pandemics goes with resources and have proven non-productive. Need for strategic, community ownership for sustainability of disease control that can be scaled-up to other communities (i.e., develop strategies for innovative, sustainable community engagement for effective disease control.)

- Harness indigenous knowledge and STI though a multi-disciplinary approach (community, scientists, social scientists, policy makers, etc) in order to take into account relevant community needs for effective disease control.

Dr. Ernest Foli, co-author of the GSDR, presenting the results of group 2

- Primary Health care systems are not strong in communities. Need to restructure the health care system by empowering the healthcare delivery system (taking into account water, sanitation, etc) to control diseases.
- "Infrastructural Tsunami" in Africa is having a negative impact on health and well-being. Need to use freely available earth-observation tools (satellite imageries) to aid proper municipal/urban planning that contributes to well-being.
- Sustainable disease control will depend on cutting-edge health research, but this is challenged by weak organizational systems. There is need for a clear strategy on strengthening research institutions based on Quality Management Systems (QMS) and ISO standards to make research acceptable internationally.
- There has been active research, e.g., on malaria, but the results have not been translated into the drug industry for effective disease control. There is need to develop innovative strategies, with Diaspora expertise, to strengthen African research based on indigenous knowledge to bridge this gap. Improve medical research into disease control by fostering trans-disciplinary partnerships.
- Explore new areas of community approach to Geo-medicine (innovative science) in order to proactively maintain disease control.
- The value of forests as sources of medicinal plants is eroding due to conflicting needs (timber, agricultural expansion, mining, etc). It is necessary to establish more protected areas for ecosystem services to improve livelihoods.
- Governments should devise strategies for trans-border disease control and provide adequate funding to sustain it.

- Need to consider infrastructure/facilities and capacity development to improve the well-being of people with disability.
- Use ICT to build networks to transfer information on health delivery.
- Provide budgets for improving infrastructure for health care delivery, taking into account increasing populations in order to provide access to health care for all. Also provide priority investment on health, nutrition and well-being of pregnant women and children.

Group STISA 3: Communication (physical and intellectual mobility)

Moderator: Jackie Kado, **Note taker:** Peter Messerli, **Participants:** Al Hassan Baba Muniru - Andrew Leitch - Hambani Mashelini - Hannah Moersberger - Jean-Pascal Torreton - Jean-Paul Toutain

STISA priority 3 is stated as: Guided by the AU Programme on Infrastructure Development for Africa (PIDA), Africa is investing heavily in infrastructural development projects. Implementation of major infrastructure projects must incorporate sustainable knowledge management systems design as well as requisite human skills and competencies. While most of this knowledge has traditionally come from outside the continent, African institutions must take responsibility for integrating robust and sustainable knowledge production systems in major physical and digital infrastructure programmes. Physical communication is envisioned in terms of land, air, river and maritime routes and equipment, infrastructure and energy, while ICT is referred as intellectual communications

Who	Comment	Relevance for GSDR
Hambani Mashelini explaining overview of priorities of STISA document on communication	• STISA tries to align and harmonize the 2063 and 2030 Agenda. It tries to identify priorities what science has to do in the next year and how this should be implemented at national, regional and continental level. • It should guide the capacity development, research agenda, and innovations pursued. • For the next 10 years it should focus on key socio-economic areas as set out by the STISA challenges. • The challenge remains to have a coordinated science system across governments and countries but also to have the publicity of science to advance the visibility of science vis-à-vis parliamentarians and the public. • Communication is essentially oriented towards the investments in infrastructure. This is more than scientific infrastructure abut general infrastructure and the scientific guidance of this. It includes air, road, marine, as well as ICT infrastructure and more. • Science has to play a critical role in understanding what type and what purpose the infrastructure has.	• General alignment
Comment by Andrew Leitch:	• Students in South Africa strongly claim to have "nothing for us without us", i.e. claiming to have a say and be involved and not just be given by external actors.	• Means of Transformation: technology • Pathways
Jacki Kado	• Makes a link between the STISA priority and the SDGs, notably 6 (water), 7 (energy), 9 (infrastructure), 11 (cities), 13 (climate action). But it	• Overview of 2030 vs. other Agendas, i.e. introduction

	should also include communication structures and channels and their users.	
Hannah Moersberger and Jean-Pascal Torreton	• It should also include the communication of and within science. • The European example of Erasumus as a huge success story.	• Role of science
Peter Messerli	• We need to differentiate the development of science infrastructure and the challenges science itself has when supporting development. • In the case of infrastructure science should of course provide expertise abut also broader foresight on what infrastructure: how can lock-ins into pathways be avoided and leapfrogging supported?	•
Jackie Kado	• We need to cover both the physical as well as intellectual mobility such as exchange of ideas and their support by infrastructure.	• Role of science
Andrew Leitc	• Africa has to take critical decisions about installing a long-term oriented infrastructure. Example South Africa with big debate about a coal firing plant in construction (with delay) while the renewable energy is getting cheaper and is taking off rapidly. • Also, specifically for Africa it is important to not only put in place the infrastructure (e.g. through China) but also to have the ownership and the capacity to design and manage it.	• Energy pathways • Means of transformation: education
Jean-Pascal Torreton	• It should be the task of Universities and ministries to establish engineering schools across the continent given the huge backlog in infrastructure Africa has.	• Role of Science
Alhassan Baba Muniru	• There is a huge need for an new collaboration between industry and science to ensure this task. This would also help to avoid the brain-drain, as this opens perspectives for returning students. The could even be obliged by their donors from industry.	• Role of science
Jean-Paul Toutain Peter Messerli	• Africa should be autonomous in the capacity for design and implementation but also in terms of the capacity of experts that need to be trained. • Furthermore, new schools of engineering are needed that embed the infrastructure in Sustainable Development, i.e. that can navigate the synergies and trade-offs with social and environmental aspects of development.	• Means of Transformation
Andrew Leitch	• Best practices of doing both, i.e. inter-disciplinary training as well as educational models that avoid brain-drain are available from South Africa.	• Role of Science
Hannah Moersberger	• Technologies are evolving fast and few countries are spearheading the development: is this a reason to leave Africa to learn about it or is the lacking connection to industry? Alhassan things it is both.	• Flows and mobility
Jackie Kado	• Due to the huge challenge to build knowledge infrastructure we should create centres of excellence where people can meet and work together.	• Role of Science

	• The priority on STI is generally too low and we lack investment to put up the infrastructure and the political will.	
Jean-Pascal	• The mobility of intellectual capacity can overcome the slow infrastructure development.	• Flows
Pete:	• What do we need in the short term of the next 10 years to produce the necessary knowledge. • Whose tasks is it, can we formulate messages to certain ministries, .e.g request a collaboration between science and development ministries.	•
Jackie Kado	• Foster innovation hubs where science needs industry and enhance entrepreneurial skills. Political will is needed but local industry should finance it, for example, cement industry could be interested and have incentives to involve researchers.	• Role of Science
Jean-Paul Jackie Ahassan Jean-Pascal. Hambani	• Excellence is needed but not all countries can do that. Hence we need transboundary governance of science to avoid duplicating efforts and maximise synergies. • Regional economic commissions should play a role, necessitating the harmonization of curricula. • Exchanges within African countries even at school level is a key. • Can AU ensure the leadership for such programmes? • Yes, there is a strategy for education as the commissioner has outlined in her keynote	• Role of Science
Jean-Paul	• Dynamics of integration in Africa is happening faster than dynamics of development. This is an asset for Africa, as it has led to many difficulties in Europe where this was the contrary. There a lot of integration has to be designed based on very different development pathways. Can touch many fields.	• Flows and interactions chapter
Jean-Paul Jackie	• New problems of fast growing infrastructure (LAPSET, etc.) such as transmissions of pathogens, human trafficking, etc. etc. Science should point out the importance of the specific risks of infrastructure development in Africa. • This is a huge challenge and can only be met by interdisciplinary and transdisciplinary approaches.	•
Jackie Jean-Paul Jackie	• Cities will grow very fast and this will result in informal settlements. Also, the infrastructure for rural areas to feed the urban centres is not in place. • Peri-urbanization with low densities is a result of the speed with lack of public infrastructure, education. This is specific to Africa and solutions from Asia are not feasible as there is less capital. • As rural areas will not be able to produce all the food, hence urban agriculture will be a huge topic. • We need to create smart-villages in urban and rural areas as an innovative approach to decentralisation.	• Urban pathways

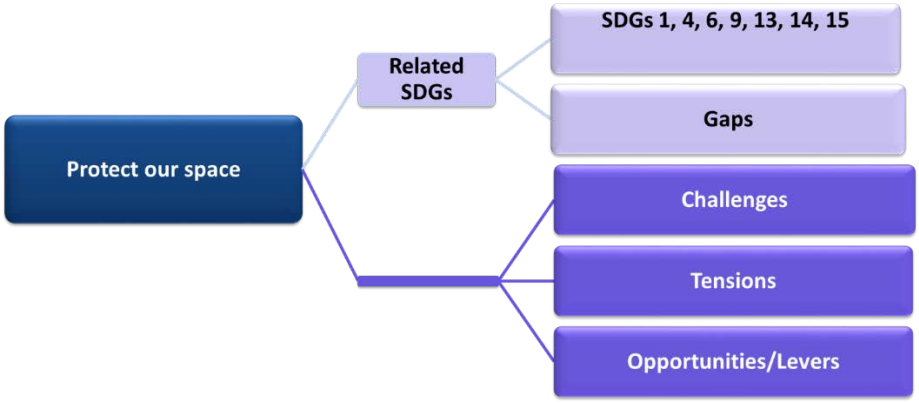
Andrew	• This will allow to mechanize the agriculture and increase the productivity while keeping labour opportunities in the whole supply- and transformation chain. Farmer must be a job opportunity that is attractive to young people in urban and rural farming. • Develop a vision for a high-tech urban (and rural) farming offering well-paid jobs is needed. • Also the fishing industry needs special attention that relates to climate change.	Food, Work and Land pathways
Jackie Hambani	• Regarding climate adaptation and mitigation early-warning systems are critical besides the resilient city development • DRR processes	•
Ahassan Hannah Jean-Paul	• Critical importance of environmental sanitation • Key is more on implementation than designing • Service provision in cities must be designed for small cities and could be also designed as intermittent services (health) vs. permanent services to save cost and increase provision: "smart services". • A lot of knowledge is available and must move to implementation while some interactions with SDGs and targets need to be explored.	• Water and urban pathways
Andrew	• Need to establish incubators in townships to innovate and systematically learn from innovation for urban and peri-urban development. • This could also lead to employment which is a key problem in this area. • Hence science by going transdisciplinary can become a job-creator in itself which is particularly relevant for Africa.	• Urban • Role of science • work
Jackie Peter	• Innovation can lead to new problems in form of pollution such as electronic waste. • Africa with a huge labour force could become a pioneer in labour-intensive circular economy and cradle-to-cradle economic pathways.	• Introduction on pollution and flows of pollution • Work Pathways
Peter Jackie and Peter	• What is the capital and where does it come from to start a virtuous circle of innovative infrastructure development and capacity development. • Create mechanisms to include innovation and capacity building in the payment of infrastructure. That can be local (e.g. water bills) but could also be regional and continental. For example, huge infrastructure investments through grants and loans (China, World bank, etc.) should include mulit-lateral negotiations to build innovation and build capacities within Africa. • This needs a shift in mind set of decision makers and innovations in policy coherence.	• Role of economy • Policy coherence • Governance of SDGs at national level

Jackie	• This is only possible by better negotiation skills of policy makers but also platforms for policy coordination and science-policy dialogue	• Role of Science

Group STISA 4: Protect our space

Moderator: Akiça Bahri, **Note taker:** Jean Albergel, **Partcipants:** Jean Luc Chotte - Mekki Insaf - Alioune Kane - Michael Obasola Olatunde – Flurina Schneider - Abdoulawahab Mohamed Toihr - Gete Zeleke

STISA priority 4 is stated as: Earth Observation and Monitoring of Africa's abundant natural resources, including minerals, and biodiversity (and associated indigenous knowledge), are important for conserving the welfare of current and future generations. Currently there is a need to address the huge gap in terms of the requisite infrastructure and critical human resources at all levels to fully realize the potential benefits that would accrue from the sustainable use and conservation of these resources. Space presents a unique opportunity for the continent to collectively address socio-economic development issues through derived services such as Earth Observation, Navigation and Positioning, Satellite Communication Space Science and Astronomy. It further provides a platform for Member States to cooperate and share the enabling infrastructure and data and jointly manage programmes of mutual interest such as disease outbreaks; natural resources and the environment; hazards and disasters; weather forecasting (meteorology); climate change mitigation and adaptation; marine and coastal areas, agriculture and food security; peacekeeping missions and conflicts.



The SDGs where STISA Priority 4 is involved

Group STISA 4 "Protect our space"

1. Environmental Protection including climate change studies
2. Biodiversity and Atmospheric Physics
3. Space technologies, maritime and sub-maritime exploration
4. Knowledge of the water cycle and river systems as well as river basin management

Add **SDG 1 Poverty** (Protect our space to decrease poverty) Important for Africa

1. Currently there is a need to address the huge gap in terms of the requisite infrastructure : SDG **9 Infrastructure**
2. Space presents a unique opportunity for the continent to collectively address socio-economic development issues : **SDG1 Poverty, SDG4 Education**
3. To consider the objective of the STISA P4 : To provide a platform **SDG9 Infrastructure** for member states to cooperate and share the enabling infrastructure for :
   - disease outbreaks; **SDG3 Health**
   - natural resources and the environment; SDG**14 & 15 Environment**
   - hazards and disasters;
   - weather forecasting (meteorology); **SDG13 Climate Change**
   - climate change mitigation adaptation; **SDG13 Climate Change**
   - marine and coastal areas, agriculture and food security; **SDG2 Zero Hunger**
   - peacekeeping missions and conflicts **SDG16 Peace**

Gaps

- Air quality
- Space technology
- Demography and population growth : problem / opportunity Protect our Space different
- Hazards & Disasters (earthquake, tsunami, etc.)

Challenges for Africa

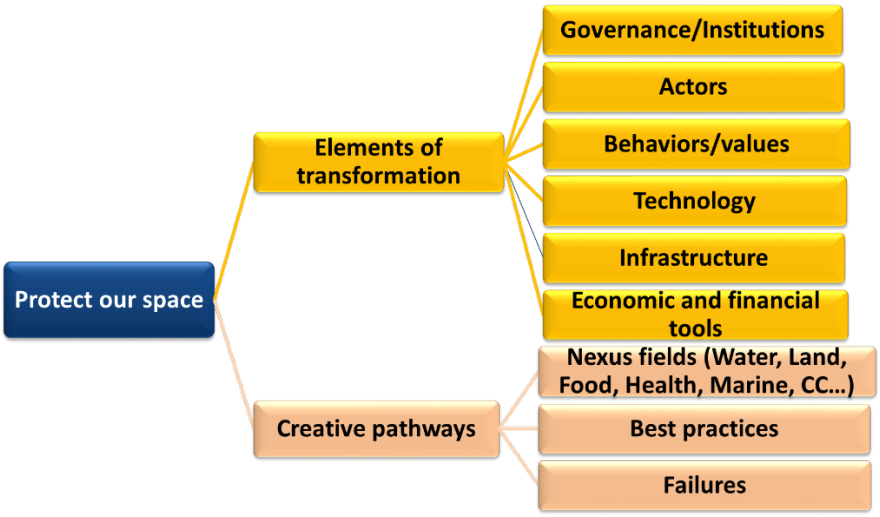
- Poverty : alleviate poverty / Wealth regulation
- Capacity development / quality of education
- Political organisation / governance /regulation
- Environment protecting / climate variability / Wealth regulation
- Sea level rise (for Islands states/coastal cities)
- Developing Infrastructure (roads, dams, railway, power plant, water treatment plants, etc.)

Tensions

- Dealing with different space and time scales (Multinational/foreign interests vs Local needs, Politicians vs researchers);
- Long term / short term (different agendas between politicians, industries, and researchers)
- Environmental protection vs the needs of the poor
- Society (increasing population) vs nature
- Priorities of different stakeholders
- Competing interests
- Needs vs available funds

Opportunities and levers

- Change of mind-sets
- Capacity and potential of young people
- Adaptive capacity of African societies to take on the challenges
- Existing good connection with nature in the African cultures
- Communication ICT adopted in Africa (Mpesa)
- Frugal Innovations



Elements of transformation

A gap in the GSDR Infrastructure:

Governance / Institutions

- Power structures
- Respect rule of the low
- Fighting corruption

Actors

- Increase in Africa of the role of the Civil Society
- Define the role of each stakeholders (Govts, NGOs, Private sector, local gvts and communities) in the Space protection

Behaviors / Value

- Responsibilities at all levels (Govts, NGOs, Private sector, local gvts and communities)
- Continuity in policies
- Duty of care
- Equity, Ethics

Technology

- Green Jobs
- Opportunity of ICT and high technology
- Frugal innovations
- Space technology to be developed
- Green technologies

Infrastructure

- Needs in Africa : dams, roads, railways

Economic and financial tools

- Free trade agreement between African countries / taxes from out of Africa
- To keep the trend of Circular economy traditionally developed in Africa

Creative pathways

Nexus fields

- Most important one: Nexus Water-Food-Energy
- Grid inter-connection

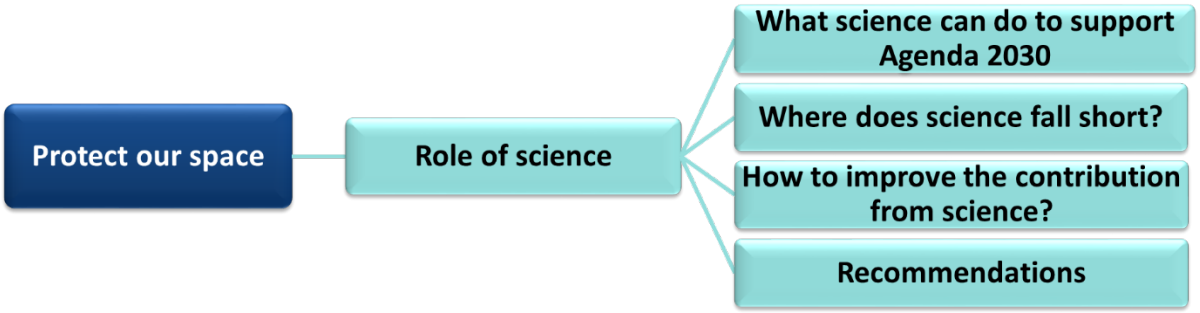
Best practices

- Development of Aquaculture
- Hydroponics to grow vegetables
- Domestic waste management
- Learning watersheds : water harvesting
- T-Learning (Transformative, transgressive, transdisciplinary)
- Protect and develop Protected areas (marine and continental) to preserve / Traditional Forest Management
- Fighting desertification (North and South of Sahara)

Failures

- Intensive Slash / burn
- Political system failures / Weakness

Role of Science



What science can do to support Agenda 2030 / How to improve the contribution from Science

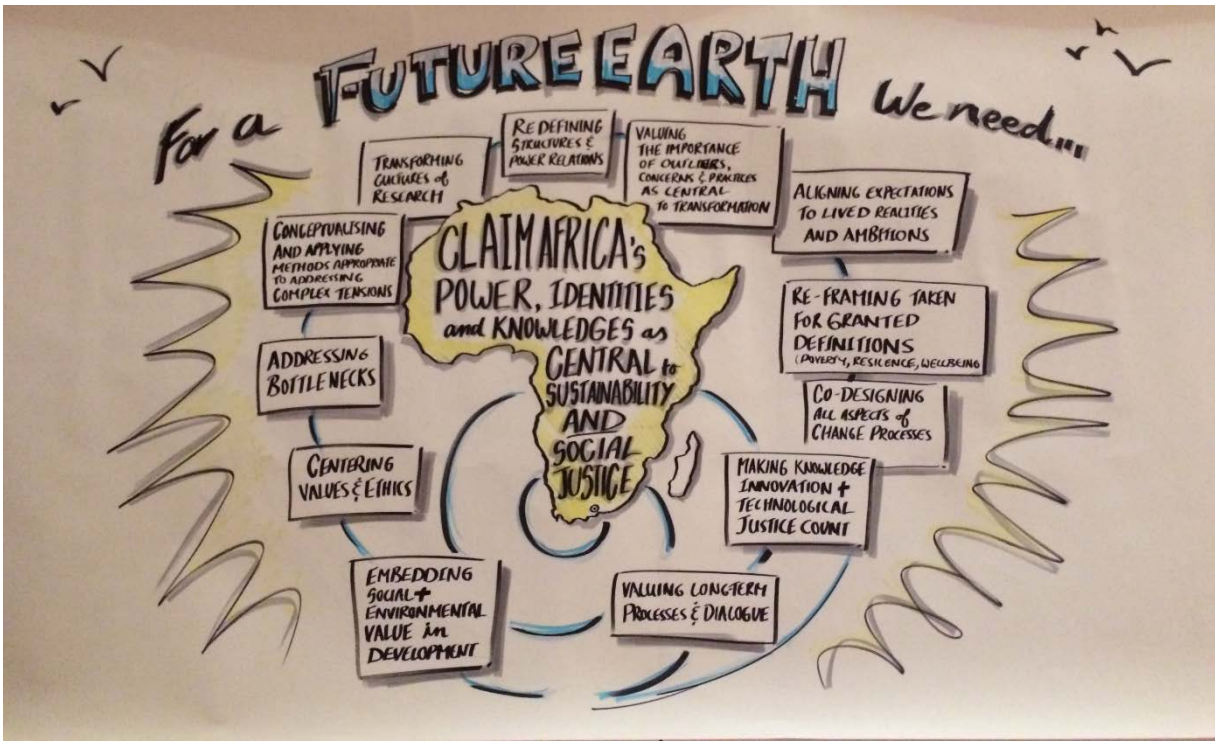
- To establish a baseline for the SDGs
- To develop Monitoring SDGs
- To develop and to interconnect observatories of Environment / Society / Health
- To develop observatories on Changes and Transformations
- Remote sensing / GIS
- Monitor and upscale good strategies
- Science for Harnessing Indigenous knowledge
- Develop science for innovation / Solution oriented science
- Transdisciplinary research
- Prospective Science

Where does science fall short

- Failure in communicating scientific results to the policy makers
- Lack of long term strategy in science / corrected by STISA 2024

Recommendations

- Refer to Professor Aïdara's speech
- Strengthen Science / Policy / Society interface
- Making Knowledge innovation + technological Justice Count



Group STISA 5: Live together - Build the society

Moderator: Sarah Anyang Agbor, **Note taker:** Cheikh Mbow, **Participants**: Robin Bourgeois - Wendy Broadgate - Aïdara Daouda – Désirée Kosciulek - Johanssen Odhiambo Obanda - Thokozani Simelane - Odirilwe Selomane

STISA priority 5 is stated as: Living together in peace and harmony is increasingly becoming a challenge for the continent. In a few years, Africa will have more than one hundred (100) mega cities, each with more than one million inhabitants. Democracy and integration related issues can be addressed through community driven solutions that leverage the knowledge of African shared values. Africa is strengthening its governance capacity as many African countries reorganize their state structures to foster entrepreneurship, flexibility to be more responsive to the needs of citizens and champion innovation. STI will help strengthen the capacity of AU Member States to build necessary infrastructure, train future generations of political and social leaders, business people and entrepreneurs, scientists and researchers, and leverage STI for sustainable socio- economic development. This will require a multi-disciplinary approach incorporating social sciences, humanities, and natural sciences.

Framing

- Social structures in Africa are different but are not considered in development schemes dominated by neo-liberal systems
- Family level as an important building block that is basis of the African culture for peace and harmony. With globalization, the family culture has changed. Single parents, teen age pregnancy
- What is a community? Sense of community change depending to context. A community may not be clustered in the same geography (e.g. of cities)
- Children under 18 are not mentioned. The set of priorities, as we need more teachers to harness a dividend to avoid a burden
- Many conflicts at various scales: rural-urban, rich-poor, ethnicity, inter countries, business-substance, competition for NR, inter-generational

- Sources of disharmony: Migration, youth unemployment, urbanization, resources allocation, job opportunities
- Justice and democracy
- Challenges: dealing with knowledge and governance

Challenges: dealing with knowledge and governance

- Education, infrastructure, migration, health challenges
- Condition of leaving, in cities (individualism), social differences, civic rights
- Fragmentation of governance: multi-centric decision making >>> divergences
- Weakened social-networks because of poverty rising
- The rural environment relates to urban in various social fabrics and pathways
- Human behavior changes by context (e.g. violence), identity is changing
- Respect the will of people and put that will to action: Communication
- Raising awareness about the key elements of harmony: laws and regulations, constitutions often are changed and people does not keep track

Challenges: changing behavior, adaptation

- Poverty alleviation is key
- Social representation of wealth (cliché of Europe or cities) that derive population movement (consequences security, health housing issues)
- So many conflicts at various scales: Regional National, Community
- Weak Policies for building society
- Diversity of communities: Dealing with emerging informal systems

Challenges: Global implication of local conflicts

- Alliances and opportunistic conspiracy between countries (sometimes external to Africa)/Pan-Africanism and regional-integration
- Climate change as a source of conflict such as competition for land and water
- African culture against Globalization, the sense of identity, developing new abilities to access new opportunities, change in behavior and brainwashing under new information pathways including social medias (AU: African Cultural Charter-2006, but only 12 ratified it)
- Balancing agri-business and small holders farmers. Empowering the local farmers

Solutions

- Building Citizenship: building profile of citizen that reflect the ambition for peace. We need education beyond instruction
- Harnessing Values of governance and democracy: building regulations that are genuine and conducive to harmony, find channels for people to express themselves
- Common History should be shared as a basis for connecting people. Beyond that we should establish a communication schemes between decision makers and citizens
- Create Space for dialogs at various scales. Reflecting various view and needs
- Economic prosperity should be shared: equity between various social segments. In addition to poverty alleviation tackle benefit sharing countrywide, issues of planning development to benefit all.

- Reducing conflicts in Africa as a starting point for initiating development without which peace will not happen
- Develop ownership of development asset by communities/territorializing of development
- Develop support systems for local needs: enabling condition such as space for exchange between various stakeholders
- Scale-up various innovations to value local resources. Develop social entrepreneurship. How to unleash the potential for youth, women
- Develop interest groups and mobilize resources: investors should meet local market opportunities and secure food production
- Re-enforce agriculture as a mean of employment: production and transformation, reduce work hardship.
- Use ICT to sensitize people

Key highlights

- Acknowledge the emerging rise of demographic in Africa. All development policies should consider the youth and their aspirations
- Strong push on entrepreneurship but there are other places for developing active citizenship beyond business. Just create space for the youth
- What will make youth in rural areas stay in their areas and have a decent leaving and revisit why only urban centers has opportunities.
- Addressing power relationships at various scales
- Condition for peace and harmony: rely on education and communication
- Preserve our culture and open to others: Example of Asia
- Conflict prevention and invest in conflict resolutions (so many conflicts in Africa)
- Informality is growing in Africa and should be considered in various scenarios to address harmony
- Monitoring progress through data risk of conflicts etc.
- Re-enforce communities institutions to manage their own security (consider indigenous and local knowledge)
- Committed Political leadership to implement the recommendations
- Equity in accessing services (sanitation, clean water, waste management, energy, health services, security)

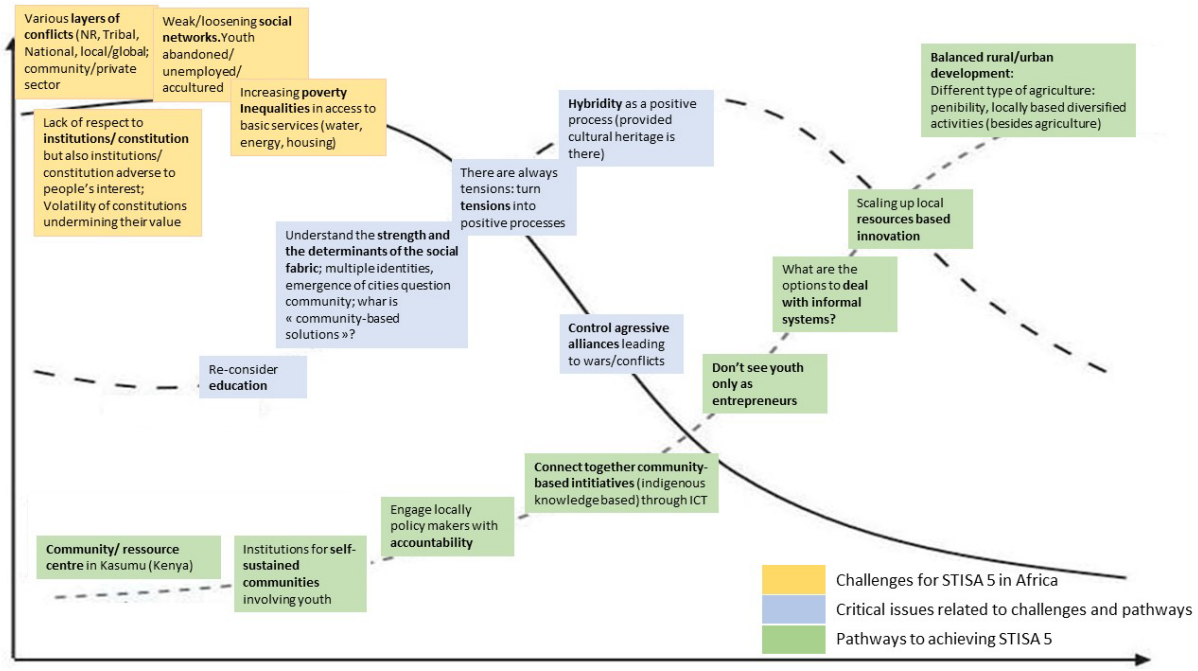


Figure xx: Three horizons scenarios conceptualized the STISA 5 working group on "Live together – build the society"

Group STISA 6: Create wealth

Moderator: Sarah Lawan Gana, **Note taker:** Myriam Truffert, **Participants:** Doudou BA - Ndiyamthanda Matshoba - Jo Mulongoy Kalemani - Anne Kyomugisha - Laura Pereira - Loubie Rusch

STISA priority 6 is stated as: Africa's greatest hope for continental development is its vibrant human resources. However, to accelerate Africa's transition to an Innovation-led, Knowledge-based Economy, our Human Resources must be empowered with the necessary skills and greater emphasis must be placed on innovation and on appropriate adaptation of technology and existing research results. It is necessary to promote creativity and innovative technologies to locally process the continent's abundant natural resources, and to create more wealth and jobs for the youth on the continent. This priority will develop internal capacities; spur the co-creation, development and marketing of new or improved products and services through engagement with end-user communities. This will create new opportunities for value-added employment by adapting and commercializing the outputs of national and regional Innovation across Africa. Conducive political and financial environment is a requirement for strengthening creativity and technological innovation that brings about entrepreneurship in new technological frontiers such as nanotechnology.

System approach to identify diff elements towards transformation, in order to create wealth in Africa.

Platform accessible for youth to innovate

Tacking stocks

What are the tensions, contradictions, but also opportunities, points to leverage?

Loubie: Current food system has polarized. The industrialization (large scale vs ind. Farming) has worsened the food security and produces massive waste. Linking waste and indigenous knowledge. → **GSDR relevant for <u>Food</u>**

Doudou: Unemployment, taxes and brain drain ("brain losses") are often linked to the state of training and education. In many African countries, education is not fitted to our needs. Graduates do receive diplomas in standard systems (French LMD : licence, Master, Doctorate), but the environment they come in is not fitted and lacks the technologies they were trained for. The result is brain drain to spaces and environments where those technologies exist. Education and training should be fitting local contexts, needs and priorities. → **GSDR relevant for <u>Work/Education and Well-being</u>**

Sarah : Labor force will rise from 620 mio in 2013 to nearly 2 bio in 2063 and in 2050 half of the world's children will be Africans

Anne: The saying "Give me a fish and I'll eat for a day. Teach a me to fish and I'll eat for a lifetime". Case study: Short-term help creating a seed that is not sustainable. We need to break these vicious circles. Marketing driven rather than trying to empower them. → **GSDR relevant for <u>Food</u>**

Sarah: In summary, SDG 2 for food security and SDG 16, inclusive and peaceful society.

Ndiyamthanda: The youth make up the larger population, but the youth is undermined. Case of South Africa and land access. Collaborating with white farmer, and stop thinking of being black or white, as the question is not "to include the black people", but should rather be "include the youth". NDPs. Diamond? → **GSDR relevant to <u>Work</u>**

Sarah: Underlying inequality SDG 10

Jo: Knowledge gaps: we do not have a good exemplary of the available natural resources. Lacking information on the value of what we have was also one of the issues for the IPBES evaluation. So far, the African economy have been importing. 1: need investment (in institution for political stability and the environment) 2: develop the human skills . Data is in the public domain, but some of them are free of charge and accessible online. We have some institutions (e.g. Pan-african university etc) that would have this potential: points of leverage. → **GSDR relevant to <u>Water and Ecosystem services/Land and Ecosystem services</u>**

Sarah: In summary, natural resources and economic rationale. SDG 12.

Sarah: Kigali trade agreement ratified by Kenya and Ghana already. SDGs 12, 15. Listing a few ideas: internet (how do we use efficiently, MUX?), and drones, artificial intelligence, pay as you go system with solar energy: smart ways of doing thing. Circular economy, decentralization, frugal inovations, universal earth coverage… Please share the papers.

Laura: "Wealth creation" gives idea that there is no wealth: change the narrative. We measure by GDP, by economic growth, by job employment. Role of women at home is not counting in these types of narratives. Need to be more inclusive. If we break this narrative, we see the potential. Different forms of technology. And traditional food and medicine. Access question is essential. Leapfrog future. ICT for food, energy, …

Loubie: identity question; We are being disconnected from where we are. Reconnect from where we are would create knowledge. The way of how well-being is addressed in the STIS (?) 24 plants to monoculture . The way they convert it to make it a commodity. → **GSDR relevant to <u>Food</u>**

Sarah: In summary, the human capital and GDP question. Informal sectors and the work of women at home doesn't count: we have to include SDG 5. Absence of national authorities. Access to knowledge, to land, the basics, … Trauma and the suffering of Africa.

Laura: will send case study from Nigeria → **GSDR relevant for <u>Food</u>**

Sarah: Current criteria to measure development of innovation (global innovation index by WIPO): electricity output ranked with patents as parameters, Wikipedia edits, YouTube uploads…

Doudou: Valorisation of the research' results: the population have to be informed of them. Technology transfer paper). → **GSDR relevant to <u>Flows</u>**

Loubie: Decolonisation of education. (reclaim identity) → **GSDR relevant to <u>Education</u>**

Jo: Sustainable tourism. Learn from the failures of other countries (e.g. plastic production, fossil fuels…) → **GSDR relevant to <u>Work/Energy/Urban development</u>**

Doudou : The flows of Northern countries to Africa of used objects need to stop. Yes to recycling, but with local waste. → **Relevant to <u>Urban development/Flows</u>**

Pathways of Transformation

Loubie : as a starting point, shifting our thinking and the way we frame transformation and development.

The growth-jobs-poverty nexus is debatable.

Sarah: *Actors? Behaviors? Technologies? Insitutions/policies? Finance? Best practices? Failures? Role of science? (concrete contributions, recommendations)*

Yellow post-its: <u>challenges</u> (top) and <u>assets</u> (below); Green post-its: <u>transformation</u> (middle)

Challenges	Assets	Transformation
- Industrialized and globalized food system - Corruption and greed in governments that reduce Investment - Trauma and Healing of African natives - Neglected food crops (inventory, value assessment, promotion) - Wealth concentrated in hands of few (inequalities) - Overconsumption in growing middle class Africa is unsustainable - Research is disconnected to Africa's priorities - Excessive food waste - (Development) is disconnected from local knowledge and identitty - High and unsustainable cost of living - Illiteracy - Waste	- Youth as potential innovators - Informal sector - Rich biodiverse resources base - Traditional and indigenous knowledge and resources - Medicinal and cosmetic knowledge/research/use (including ILK)	- Equipping the youth for land ownership and develop their potential - Restructure/review education relevant for Africa - Training in local context useful skills - Research and investment on Energy: solar, hydro, biofuel and gas, and wind energy - Healing of Trauma and re-perceptions - Shift our thinking - Democratize "Access to …" - Intra-African and regional integrative solidarity - Address corruption - New High and Low technologies → circular economy for Africa, not external - Recognise and value informalisation - Reclaiming/regaining dignity and confidence - Provide free and creative platforms to youth to explore and innovate - Develop sustainable tourism - Reframe thinking and reclaim identity - Valorize and develop Africa's ILK systems - Lobby on African identity in global context - Know and understand our local resources for value add - Leapfrog to best practice → no plastics, fossil fuels, or "development"… - Investment in appropriate infrastructure - Appropriate/strong institutions and incentives - Acknowledge and process trauma - New Metrix, e.g. well-being, grass root, diversity… - Adaptation - Valued integration of Africa into world - Recognising the role of women in Africa - Reframe consumption aspirations and models - Assessments - Conducive environment for entrepreneurship - Reconnect with who we are/whehe we are - Valorisation of research outputs - Decolonized education - Democratisation of knowledge - Diffusion and dissemination of African innovation - Break patriarchy

Role of Science

Recommendations:

- Decolonization of education (Note: decolonization of science is a current big topic in South Africa)
- Revalorisation of research output (see African journals)
- Democratization of trends to population
- Support alternative/informal/indigeneous innovations outside of Science through trans-disciplinary collaboration and innovative models.
- Support informal/alternative research through substantial Funding commitment: at least 1%
- Evidence from the ground and informing sciecnce must inform decisions to have actions taken
- Increase target in terms of scientific publications: global and African
- More South-South opportunities

Facts and figures

Collected and prepared by Sarah:

- Taking Stock beyond GDP (#estimation 4.1 % in 2018; labor force will rise from 620 mio in 2013 to nearly 2 bio in 2063; in 2050 half of the world's children will be Africans)! So far Africa's recent high growth rates have NOT been accompanied by high job growth rates.
- Illicit Financial Flows (also from Nat. Res. Incl. Logging and IUU fishing; oil and minerals)
- Industrialization (to end poverty and generate employment for the 12 mio young people who join it's labor force every year); manufacturing dimension (is it a sustainable practice?); build special economic zones and industrial parks
- Free movement of people & goods via infrastructure (#needed about 150 bio $ a year with currently about 100 bio $ gap)
- Doing business (globally hence negotiation capacity in WT agreements or legal representation; and within Africa itself: 57% of African population corresponds to TFTA (the tripartite agreement)
- Innovation (in SA for example expenditure in R&D is 0.7% of GDP (same as India), STISA recommends African countries to reach 1%, as a comparison US (2.8) China (2.1) Israel (4.3) Korea (4.2); see the Global Innovation Index by WIPO for ex that explore publications; patents amongst the parameters for ranking there is 'electricity output', 'ISO 14001 environmental certificates', but also 'Wikipedia yearly edits' and 'video uploads on Youtube'!!! In 2013 Africa gross expenditure on R&D was 0.45); The fourth industrial revolution; role of local industrialists for local innovation development
- Energy: from PPP (public policy to facilitate private initiatives) to technology, policy, and finance to work together (decentralized PAYG) but where is science?; 600 mio people without electricity in Africa (NASA map) BUT access deficit has started to fall (world bank)
- No consensus on grow-jobs-poverty nexus: labor force reallocation from traditional to modern sector to accelerate African growth; shift from jobless growth toward labor-absorbing growth paths

- Recognition of informal sector as profitable activity
- Agro processing; productivity of agricultural sector (access to land, modern inputs, seeds, technologies, finance, capacity to adapt)
- Eco tourism (important in an African context)
- Accelerated development in science, technology and innovation (thanks to digitalization) allowing new practices (mobile money, electric and unmanned aerial vehicles, artificial intelligence, block-chain, pay-as-you-go systems, e-trade, MOOCs) and new thinking (decentralization, circular and green economy, nexus approaches, frugal innovation, regional integration, social entrepreneurship, universal health coverage and basic income)

References

IPBES, n.d. Report of the Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on the work of its sixth session.

Pereira, L.M., Hichert, T., Hamann, M., Preiser, R., Biggs, R., 2018. Using futures methods to create transformative spaces: visions of a good Anthropocene in southern Africa. Ecology and Society 23. https://doi.org/10.5751/ES-09907-230119

United Nations Environment Programme, 2016. Global environment outlook: GEO-6 : regional assessment for Africa.

Appendix 3: Workshop programme

11 May	**Venue Alliance Francaise Port Elisabeth**
18:00	**Welcoming Adresses**
	Prof Jean-Paul Moatti, CEO of IRD, member of GSDR (Chair)
18:30	Keynote NEPAD
	Topic: NEPAD priorities to achieve the obctives of 2030 and 2063 Agendas Speaker: **Prof. Martin Bwalya** Head of the Comprehensive Africa Agriculture Development Programme, NEPAD
	Discussion
19:00	Cocktail Mixer at Alliance Francaise
12 May	**Venue Boardwalk hotel. "Wood" room**
08:00	**Opening address: Dr Boniface Kiteme (Chair)**
08 :15	**Keynote AUC - HRST** Inputs on priority areas from Science, Technology and Innovation Strategy for Africa 2024 (STISA-2024, 2030 Agenda, and 2063 Agenda for Africa) Speaker: **Prof. Sarah Anyang Agbor**, Chair of African Union Human Resources Sciences and Technology Commissariat
08:45	Key Note: Académie des Sciences, des Arts, des Cultures d'Afrique et des Diasporas Africaines Topic: potential for excellence and social impact of African science, reflecting on the Abidjan call (AU-EU summit, November 2017)
	Speaker: **Prof Daouda Aidara,** Président
09:15	**Recap GSDR**
	Speaker: Ernest Foli
	Discussion
09:45	**Coffee break**
10:00	**Working groups convene separately**
10:30	6 working goups on the STISA priorites /
	STISA Priority 1: Eradication of hunger and achieving food security
	STISA Priority 2: Prevention and control of diseases
	STISA Priority 3: Communication (Physical & Intellectual Mobility)
	STISA Priority 4: Protection of our space
	STISA Priority 5: Live together – build the society
	STISA Priority 6: Wealth creation
13:00	**Lunch**
14:00	**Working groups present their results: Ms Myriam Truffert (Moderator)**
	20 minutes by group
16:00	**Coffee break**
16:15	**Discussion on informing the GSDR: Ms Sarah Lawan Gana (Moderator)**
17:30	**Closing remarks: Prof Jean-Paul Moatti**